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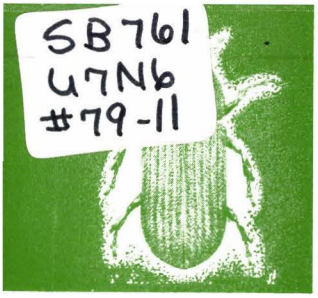

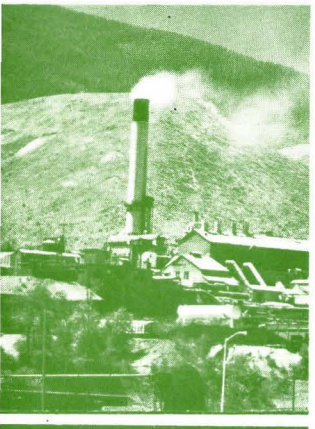

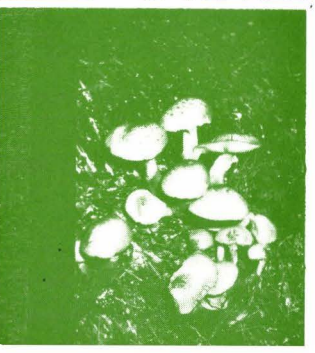

FOREST INSECT & DISEASE MANAGEMENT

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PROGRESS REPORT ON SPRUCE BUDWORM DAMAGE IN IDAHO AND MONTANA, 1978

BY

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INTRODUCTION

Western spruce budworm 1/ has been a serious pest in Montana and Idaho Forests for many years (Johnson and Denton 1975). Concern over injury and mortality is shared by managers attempting a sustained harvest on a shrinking land base available for timber management.

This is a progress report of a survey conducted in 1978 on three National Forests. Data collections on defect caused by top killing will be made in 1979 and measurements of diameter and height growth will be taken in several sample stands. A final report will be produced in 1980.

METHODS

Loss assessment data were obtained from three National Forests--St. Joe, Lolo, and Helena--in 1978. These Forests represent ecosystems in northern Idaho, western Montana, and eastern Montana that have had a history of extensive budworm damage. The sampling unit was a stand as delineated and identified by timber management planners. Stand selection for spruce budworm damage assessment was based upon existing timber inventoried areas on the Lolo and Helena National Forests.

Adequate number of stands within the historical boundaries of spruce budworm defoliation on the St. Joe did not exist and new selections were made on this Forest.

Within each stand a series of variable plots (40 basal area factor) were established on a 5- by 10-chain grid to estimate the population. The number of plots ranged from 7 to 25 per stand depending upon stand size.

Data collected for each sample tree were species, d.b.h., height, 10-year radial growth, and severity of spruce budworm damage. Three classes of defoliation levels and three classes of top kill severity were used to characterize spruce budworm damage for sample trees. Data were analyzed by the computer program INDIDS (Bousfield 1979). This program produces statistical data on each stand displaying damage in terms of trees per acre, basal area, cubic feet volume, board feet volume, actual periodic annual increment, and expected periodic annual increment. This information was given by species, damage class, and three size classes.

1/ Choristoneura occidentalis Freeman

RESULTS TO DATE

The results to date show that the most serious damage has occurred on the St. Joe National Forest in terms of growth loss and top killing. This is in the grand fir type in Idaho where the infestation has persisted for about 10 years. Growth loss in terms of P.A.I. (Periodic Annual Increment) was 5.3 cubic feet per acre per year. This represents 8.6 percent depression of the total expected growth for all 73 stands examined. Growth loss ranged from 0 to 22.7 cubic feet per acre per year. Top killing averaged 88 trees per acre on the St. Joe Forest (table 1). One of the sample stands had 509 trees per acre top killed. Budworm-killed trees were recorded; however, because of the difficulty in determining what actually caused death, no loss estimates were made.

On the Lolo National Forest, which represented the western Montana ecosystem, growth loss amounted to 1.5 cubic feet per acre per year. This was 4.6 percent below the expected growth. This infestation has persisted more than 10 years. Growth loss ranged from 0 to 18.2 cubic feet per acre per year for the 63 stands examined. An average of 77.5 trees per acre have been top killed by repeated defoliation. In one of the sample stands 742 trees per acre were top killed by spruce budworm (table 2).

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OCKY MOUNTAIN STAT

Losses on the Helena National Forest, which represents the eastern Montana ecosystem, did not seem to be as serious as the other ecosystems. Spruce budworm infestations have been at epidemic levels for at least 10 years. Historically, a persistent infestation has been recorded on the Helena NF.

Host type was mostly Douglas-fir and not as subject to top killing as grand fir. Growth loss was only 0.2 cubic feet per acre per year with a maximum of 10 cubic feet in one stand. This amounted to 0.6 percent of potential growth. Top killing averaged only 12.4 trees per acre for the 81 stands examined; however, one stand had 200 trees per acre top killed (table 3).

Further analysis on diameter growth losses on the Helena National Forest is planned using existing timber inventory data.

Table 1.--Spruce budworm damage statistics from 73 stands on the St. Joe National Forest, 1978

Stand statistics	Mean	SE[1/]	% SE	Range
Trees per acre	884.9	34.1	3.8	216.9-1440.9
Basal area	137.7	7.3	5.4	.170-323.9
Trees per acre top killed	88.8	11.5	13.0	0-509.0
% Trees per acre top killed	11.4	1.5	12.8	0-50.0
Basal area top killed	23.4	2.7	11.7	0-106.7
% Basal area top killed	15.5	1.5	10.0	0-49.9
Growth loss ft.^{3}/acre/year	5.3	0.6	11.8	0-22.7
% growth loss	8.6	1.5	17.4	0-25.0
Periodic annual increment	65.4	4.0	6.1	0-168.7

1/ One standard error

Table 2.--Spruce budworm damage statistics from 63 stands on the Lolo National Forest, 1978

Stand statistics	Mean	SE[1/]	% SE	Range
Trees per acre	946.7	105.4	11.1	3.3-1680.3
Basal area	141.5	15.7	11.1	13.3-274.0
Trees per acre top killed	77.5	15.1	19.5	0-742.2
% trees per acre top killed	9.8	1.9	19.6	0-74.1
Basal area top killed	11.2	2.4	21.8	0-95.5
% basal area top killed	8.3	1.5	18.0	0-56.1
Growth loss	1.5	.4	26.6	0-18.2
% growth loss	4.6	1.6	36.6	0-35.0
Periodic annual increment	42.4	3.6	8.4	0-140.3

1/ One standard error

Table 3.--Spruce budworm damage statistics from 81 stands on the Helena National Forest, 1978

Stand statistics	Mean	SE[1/]	% SE	Range
Trees per acre	909.2	21.64	2.4	6.9-1906.1
Basal area	121.8	7.39	6.1	133-376.1
Trees per acre top killed	12.4	3.37	27.2	0-200.0
% trees per acre top killed	1.62	.49	30.2	0-29.8
Basal area top killed	2.9	.52	17.9	0-17.3
% basal area top killed	2.7	.56	20.7	0-26.4
Growth loss	.2	.07	35.0	0-10.0
% growth loss	.6	.20	33.3	0-4.9
Periodic annual increment	28.4	2.14	7.5	0-87.3

1/ One standard error

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